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Financing Beef Production Systems

by

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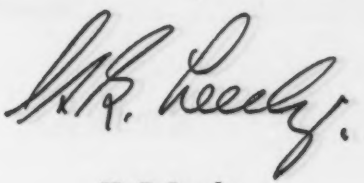
FOREWORD

Beef is the major agricultural commodity produced in the Tenth Federal Reserve District. Current trends in demand and available farm resources in the District indicate that beef production will become even more important.

There are many systems available for producing beef. The resources required for the different systems may vary widely resulting in substantial fluctuation in capital and credit requirements. Thus, individual producers require different amounts and kinds of financing.

Financial institutions in the District have been doing an excellent job of financing the beef industry. The wide variety of beef production systems, combined with rapid acceptance of technological innovation have made it difficult for both financial institutions and producers to keep in tempo with the industry's changing capital and credit requirements. It is hoped that a better understanding of the variable capital requirements in the beef industry will be beneficial to both financial institutions and producers in achieving the goal of developing the most satisfactory financing programs.



H. G. Leedy
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FINANCING BEEF PRODUCTION SYSTEMS

CHANGING DEMANDS and technological innovations have been responsible for major shifts in the production of specific agricultural commodities. Beef is one of the commodities for which demand has increased sharply, and American farmers have been able to more than double total output in the last quarter century without creating serious and prolonged price or surplus problems. Thus, the beef industry has provided an alternative use for resources previously used in producing agricultural commodities for which demand was declining or which are no longer needed because of technological innovations.

These trends are reflected in the cash receipts from the sale of cattle and calves which have increased in relative importance and recently have accounted for almost a fifth of total cash receipts from farm marketings in the United States. In the past few years, the Nation's farmers have marketed an average of about $6 billion worth of cattle annually.

In the Tenth Federal Reserve District, cattle production is relatively more important than in the Nation. Cash receipts from cattle marketings average more than $1.5 billion annually in District states, accounting for more than a third of total cash receipts from farm marketings. It is apparent then, that approximately a fourth of the Nation's beef production occurs in these states.

About two thirds of the total farm land in the District is used for permanent or rotation pasture and large amounts of supplemental grazing are available. Furthermore, a large proportion of farm land now being cultivated in the District could be utilized most effectively as pasture land in the long run, according to land classification studies that have been made. Grain sorghum also is an effective crop for much of the land that changing demands dictate should be taken out of wheat production. With the demand for beef expected to continue increasing, adjustments that shift the resources taken out of wheat production into pasture and feed grain production would appear to be appropriate. If so, financial interests can be helpful in encouraging farmers to adopt such adjustments if the problems are understood properly.

Even though the basic adjustments needed are understood, numerous specific problems need to be investigated carefully. For example, it may be generally agreed that in the long run a farmer should shift from wheat production to beef production. However, there are numerous beef production systems, all of which may be suitable for some farmers and unsuitable for others. The suitability of a particular system to a given farmer depends largely upon what resources and markets are available to him. If the wrong beef production system is adopted on a farm, the specific adjustment may be unsuccessful even though the general shift from wheat to beef was the appropriate one to make.

It also should be emphasized that the kinds of capital needed for the different beef production systems vary widely. Thus, the kinds of credit and methods of financing also vary. A rancher with a cow herd who produces feeder calves generally needs a completely different kind of financing than does the feeder. Different feeders also need different kinds of financing, depending on the particular system that is being followed.

Many of the technological innovations of recent years have resulted in the substitution of capital resources for land and labor resources. To the extent that such shifts in resource requirements have occurred, the amount and kinds of financing needed are influenced.

It will be the purpose of this study to describe some of the common systems of beef production followed in the Tenth District, to point out the varying resource requirements for these systems, and to list the major kinds of capital needed under each system. A better understanding of the variation in beef production systems by both financial agencies and producers should be mutually helpful in developing better financing programs.

Adapting the Production System to Resources

The objective of a beef cattle producer is to utilize his available resources so that the return to the enterprise will pay all costs and leave a profit as large or larger than can be obtained from alternative uses of the same resources. Since the resources controlled by individuals vary both in quantity and kind, the appropriate systems selected for utilizing these resources effectively will vary.

Available resources—land, labor, and capital—always are limited. Despite this fact, additional quantities of any resource usually can be acquired by a given individual if he is willing and able to

pay the price and assume the risks involved. As the cost or risk involved in acquiring additional resources increases, more producers will decide not to engage in a particular system. Thus, costs of resources and the risks involved will influence the number of individuals that engage in beef production as well as the particular system chosen.

Beef cattle production, especially the feeding of cattle, usually is looked upon as a high-risk enterprise. This is primarily a result of the high capital input relative to other resource inputs. In some years, returns are low or negative. Although low returns can be imputed to equity resources, borrowed and hired resources must be paid for at previously agreed rates. A low return to borrowed capital not only reduces income, but may endanger accumulated capital as well. The high-risk nature of some beef production systems explains why beginning farmers and those in poor capital positions frequently find it difficult to obtain financial aid.

This study is directed primarily at capital needs, but since the different resources are used in combination, it is impossible to completely separate land and labor from consideration. Thus, they will be considered as alternative limitations to the use of capital.

Credit Aids Efficient Resource Use

Since few beef producers own a sufficient quantity of resources to provide for their most efficient utilization without borrowing or otherwise acquiring supplemental resources, they frequently find it profitable to utilize credit facilities. Proper use of credit enables them to increase volume and to improve the efficiency with which equity resources are used.

One of the most common credit needs for many beef production systems is for funds to purchase feeder cattle. The beef producer often has feed and labor, but insufficient other capital to acquire cattle. Banks frequently make loans to farmers and ranchers for purchasing feeder cattle under these circumstances. In other instances, a producer may have the cattle and labor but need a loan to purchase feed or to meet other expenses. For example, a rancher may decide that he could increase his income by feeding the calves he raises rather than selling them as feeder stock. If he does not grow his own grain, he may need to borrow funds to purchase it or to pay for the costs of having a commercial feeder handle the calves on contract. A rancher also might need to buy feed to winter his herd when weather conditions cause feed supplies to be short.

BEEF PRODUCTION SYSTEMS

INDIVIDUALS planning a beef enterprise may have other alternatives. For purposes of this study, it is assumed that the decision to produce beef cattle has been made and that the problem is to determine which system will enable the producer to use his resources most effectively.

The objective in a commercial beef cattle enterprise is the production of a slaughter animal. Three more or less distinct stages—production of a calf, growth of a feeder steer or heifer, and fattening of the animal for slaughter—usually are involved in attaining this objective. The three stages may be accomplished by one producer in a continuous and overlapping process; different producers in a discontinuous program; or combinations of these stages. The stage, or combination of stages, used by an individual producer normally is influenced by the kinds of resources available to him.

Since there is much variation in the kinds of available resources and combinations that can be used, there are many different beef production systems as well as numerous variations within each system. Therefore, only the requirements for a few of the more common methods of producing beef cattle in the Tenth Federal Reserve District will be examined.

Eleven methods of producing beef are analyzed in this study. Each method is considered as a separate system, although some might be more appropriately classified as variations of the same system. These variations are included to demonstrate the effects of changing a major input on resource requirements, capital needs, and financing problems. Briefly described, the systems to be analyzed are:

Beef Cow Herd Systems:

1. Range beef cows calve in the January through March period. Calves are pastured the full season and are weaned and sold as feeders in the fall.
2. Farm beef cows calve in the December through February period. Calves are fed some grain prior to being turned on pasture, creep-fed grain on pasture, fed in a drylot after weaning in the fall, and sold as baby beeves in February.

Pasture Feeding Systems:

1. Choice, light, yearling steers are purchased in October, roughed through the winter without grain, pastured from May to August without grain, full-fed grain in drylot from August to November, and sold in November.
2. Choice steer calves are purchased in October, wintered on a low grain ration, pastured until August without grain, and full-fed grain in drylot for 90-100 days before marketing in November.
3. Choice steer calves are purchased in October, fed a low grain ration through the winter, fed grain on pasture in the summer, and full-fed grain in a drylot from 4 to 6 weeks before marketing in October.
4. Choice steer calves are purchased in October, wintered largely on roughage, pastured a full season, and sold as yearling feeders in October.

Drylot Feeding Systems:

1. Choice 2-year-old steers are bought in October, fed in a drylot for 120 days on a liberal grain ration and marketed in February.
2. Choice yearling steers are purchased in October, fed in a drylot on a liberal grain ration, and marketed in early May.
3. Choice yearling steers are purchased in October, fed in drylot on a liberal roughage ration, and marketed in July.
4. Choice steer calves are purchased in October, long-fed in a drylot on a liberal grain ration, and marketed in August.
5. Choice heifer calves are purchased in October, fed on a liberal roughage ration in drylot, and marketed in July.

METHODOLOGY

RESOURCE REQUIREMENTS used for the systems described here are based on data compiled by the agricultural colleges and experiment stations. Actual inputs can vary widely, although essentially similar programs are followed. Variation in livestock, feed, management, and other factors make determination of indisputable requirement coefficients impossible. In any actual situation, many factors can affect and alter the outcome. By making several assumptions, however, it is possible to determine requirements based on average conditions. The conditions assumed for this study are:

1. An average level of management.
2. Livestock of average capability in converting feed into meat.
3. Average quality feed.
4. An adequate size enterprise for efficient use of resources.
5. Only one group of cattle handled per year with facilities being unused when no cattle are present.
6. Farm or ranch conditions prevail. (Commercial feedlot operations are discussed separately in the concluding chapter.)

The feed grain requirements in the following sections are based on corn equivalents. If grains of different feeding value than corn are used, adjustments must be made in quantities required. The protein supplement requirement is based on soybean oil meal as the standard unit.

For some resources such as feed and labor, the physical quantities required can be determined for planning purposes. Quantities of some other resources needed cannot be stated meaningfully in physical terms. Marketing costs, interest, depreciation, and other costs of this type usually are stated in monetary terms. Furthermore, even if the costs can be stated easily in physical terms, it is frequently desirable to convert to monetary terms for comparative purposes and for financing. Thus, it is necessary to make some kind of assumptions for determining the dollar costs and price levels that are to be used. In this study, the price relationships prevailing

during the 1953-57 period will be used for converting physical resource requirements to monetary terms and for determining average costs for the resource requirements that usually are stated in monetary terms.

Average monthly prices of cattle at Kansas City for the 1953-57 period are used in determining livestock values. The annual U. S. average price received by farmers for corn and hay, and paid by farmers for soybean oil meal for this period is used in determining feed prices. Marketing costs are based on charges at the Kansas City stockyards. Interest on feed and livestock investment is charged at an annual rate of 5 per cent for the actual length of the feeding period. Death loss is estimated at 2.5 per cent for calves and 1.5 per cent for older classes of cattle. The annual charge for fixed investment in buildings and equipment is estimated from studies made by the agricultural experiment stations.

Further consideration needs to be given to the fixed investment in buildings and equipment. Every producer, regardless of the system used, has certain fixed costs for depreciation, maintenance, insurance, other fixed investment costs, and interest on this fixed investment. Furthermore, these fixed investment costs vary greatly from farm to farm. In certain systems on some farms, only the basic rudiments of lots, shelter, and equipment are required. Under these conditions, labor usually is a large input in relation to that of fixed investment. At the other extreme, farmers may substitute buildings, lots, and equipment for labor so they can handle a larger number of cattle with the same amount of labor. Labor, then, becomes a relatively small input.

The fixed investment in buildings and equipment usually lasts from a few to many years and, in providing financing for this part of the investment, the problems involved are different than those involved in financing other capital requirements for the various beef production systems. However, since the amount and type of fixed investment varies, depending on the other resources used, the amount and kinds of fixed investment required become important in planning future operations.

Resource requirements in this study are determined on a per-head and enterprise basis. To determine the size of enterprise, capital was made the limiting factor. This limitation was set at $30,000 and was determined by using the deferred feeding system as a benchmark to select a size of enterprise sufficiently large to use re-

sources efficiently and return an adequate income to the beef producer.

Land requirements in this study are given in terms of the amount of pasture needed for each system. Pasture requirements are highly variable within the District. In some areas, very little land is required to pasture an animal for a full season, while in other areas, many acres are required for this purpose. Usually, a farmer or rancher will have the necessary land before he considers a beef enterprise. It is difficult to value pasture land, since its value is frequently influenced by its relation to the total farm unit and, in some instances, pasture cannot be sold except through livestock. Thus, instead of using a land investment figure, pasture requirements were determined on a rental basis. This procedure tends to reduce costs of the capital investment in land into a current operating expense for pasture rental. Since land and labor expenses frequently are imputed costs, these costs were not used in computing the size of enterprise under the assumed $30,000 capital limitation that will be used in determining the size of enterprise.

Pasture land is rented or leased regularly in some District areas, such as the Flint Hills of Kansas. In this area, pasture usually is leased on the basis of a certain price per head for the season with a guarantee of a certain number of acres per head. During the 1953-57 period, average rents in the Flint Hills have been:

	Cows	Aged Steers	Young Cattle
Rent for Season	$24.70	$20.56	$16.14
Acres Guaranteed	6.1	5.2	3.9

Based on the rate for cows in the Flint Hills, and considering the grazing season to be 180 days, the cost of pasture in that area would be 14 cents per pasture day. A pasture day is the quantity of forage consumed by a 1,000 pound beef animal in 1 day where no grain is fed. This figure is used as a basis for computing annual operating costs for pasture. It is believed that such a figure will be more accurate for computing pasture costs for comparative purposes than would computing a figure based upon investment in pasture land and the cost of carrying this investment.

Labor is another resource for which it is difficult to make meaningful comparisons among the various systems. Frequently, labor is available from normal farm sources and actual funds are not needed for paying wages. Many beef producers do not hire extra labor to care for a beef enterprise, yet labor is a cost and, in many in-

stances, a cash cost. Furthermore, labor inputs vary greatly depending on the practices and equipment used. The recent trend has been toward using more labor-saving equipment and, thereby, increasing production per man. Therefore, wage costs and labor inputs must be considered in determining the size of enterprise to use for comparative purposes among the different beef production systems. Average labor inputs computed from studies made by the agricultural experiment stations will be used.[1] On the basis of wage rates in the District during the 1953-57 period, the rate was computed at $1 per hour.

Again it should be remembered that the production coefficients used in this study represent only an average of what can be expected under the assumptions made at the beginning of this section. Studies of actual cattle operations reveal a wide variation of input requirements. Knowledge of the factors involved in each operation will allow individual operators to adjust their resource inputs but, even so, exact requirements for a specific operation will never be obtainable prior to completion of the program. Thus, the standards used in this study should be helpful as broad guides and for illustrative purposes, but adjustments must be made to adapt the data to each system that is to be analyzed.

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[1]See, especially:
Knight, Dale A., and Bortfeld, C. F., "Labor and Power Requirements by Size of Enterprise for Beef Cattle Systems in Eastern Kansas," Technical Bulletin 98, Kansas Agricultural Experiment Station, Manhattan, Kansas, September 1958.

BEEF COW HERDS

THE BASIC FUNCTION of the beef cow herd is the production of calves. Calves are the raw material which, in combination with other basic resources such as feed and labor, eventually will result in the production of beef carcasses.

The breeding herd requires little grain or other expensive feeds. It is, essentially, a grazing enterprise and, therefore, range herds are concentrated in areas where relatively cheap grazing resources exist in abundance. Such areas usually are sparsely settled, hilly, or semiarid. Beef cow herds have become a primary enterprise in these areas and, since little or no grain is raised, the sale of feeder cattle is the principal source of income from range herds.

Historically, calves produced on the range were kept until they were yearlings or 2-year-olds before sale to feeders—usually in the Corn Belt. Today, more calves are sold to feeders shortly after weaning because of consumer preference for smaller cuts of beef and the more efficient utilization of feed concentrates by calves. Many feeders prefer feeding calves, since the risk of losses from price declines is reduced by the more efficient gains.

Cow herd operations tend to be large in the range areas. The labor input per cow tends to be reduced sharply as the size of operation is increased, at least until approximately a 100-cow herd is reached. One man can care for as many as 500 cows on some of the large ranches. In such areas where few alternative uses for their resources exist, the production of feeder calves will continue to be emphasized.

Some farms in feed grain producing areas also have abundant grazing resources and, therefore, are well adapted to cow herd operations. Actually, such enterprises are important on many farms in the Corn Belt and other grain producing areas. As farmers have adopted improved production methods, including suitable crop rotations and an adequate fertility program, they have grown increasing quantities of roughages. Beef cow operations can be found on many farms where a considerable acreage of permanent or rotation pasture exists. Such operations usually are of secondary importance, as the primary interest on such farms generally is the production of crops. In this type of operation, the cow herd becomes a sort of by-product plant for utilizing otherwise unmarketable products.

The farm breeding herd also varies from the range herd in other significant ways. The farm operations usually are smaller and, therefore, less efficient users of labor, i.e., a larger labor input per head is required. In range operations, the cowman usually is a specialist who performs other chores only as secondary duties, while the operator of a farm herd frequently cares for cows as a secondary enterprise.

Calves produced in the grain areas are often fed on the farm where they are raised rather than being sold to other producers for the finishing phase of the beef production operation. Since the farmer raises both his calves and feed, he is not faced with the problems involved in buying feeder cattle. If calves are fed on the farm or ranch where they are produced, the capital requirements for the herd will be increased and the size of herd that can be handled with a limited amount of capital will be reduced. Adding other stages must reduce the size of herd handled or additional resources must be acquired. In feeding calves raised on the farm, any of the systems ordinarily followed when calves are purchased can be used. Since these feeding systems are discussed in subsequent sections of this study, they will not be analyzed at this point.

However, the baby beef system of production will be discussed here, since it is not separable from the cow herd. A baby beef is a milk and grain fattened young beef animal varying in age from 10-15 months and in weight from 650-800 pounds. This system of production is highly specialized and differs from many of the other beef production systems. Superior type beef calves are required to put on the desired finish at the proper age and size. While nursing, they usually are creep fed on highly palatable grain rations as soon as they can be taught to eat grain. Since milk is the best fattening feed a calf can receive, the mothers must be good milk producers. After weaning, the calves are given a short feed in drylots to obtain the desired weight and finish. Advantages of this system include increased weight and finish for weaned calves, a reduced total feed requirement for finished calves, shortened drylot feeding period, and a reduction in the usual price discrimination that prevails between feeder steers and heifers.

For the farmer who produces both grain and roughage, frequently a choice exists between a cow herd or a feeder operation. In choosing, major emphasis should be given toward selecting the system that most nearly will provide for maximum efficiency in utilization of available resources. If the resources are such that either choice can be made, the cow herd has advantages and dis-

advantages. Because of the longtime nature of the enterprise, a farmer's resources are more inflexible with a cow herd. This is especially undesirable from the tenant farmer's viewpoint, since his tenure may be uncertain and he cannot depend on having similar resources if he has to move. Inflexibility also makes it difficult to change the size or type of operation to meet changing conditions.

Beef cow operations have remained important in many feed grain producing regions, since the beef herd also has advantages. The beef cow is an efficient converter of roughage to meat. Cow herds consume large quantities of roughages and, consequently, fit well in conservation programs. Finally, the longtime nature of the cow herd encourages sound planning and enables the producer to strive constantly to improve his product and increase efficiency.

Resource Requirements of Cow Herds

Two beef cow herd systems were selected for analyzing resource requirements in this study. They are the production of feeder calves under range conditions and the production of baby beeves under farm conditions. These two systems represent the extremes of the beef cow herd systems. In the feeder calf operation, only the first stage of the production cycle is completed, while in the baby beef system the production process is carried through to completion in an intensified operation.

In determining the resource requirements of cow herd systems, it was assumed that the calf crop would average 90 per cent, the cow replacement rate would be 16 per cent, and that 1 bull would be required per 20 cows. The requirements for replacement stock and bulls are prorated in determining resource requirements per cow.

Under the assumptions made, resource requirements for the two systems studied are summarized in Table 1. Requirements are given on a per-cow and per-herd basis where the size of herd would be determined by a capital limitation of $30,000. Although the size of enterprise so selected would be larger than many other operations, it is not of sufficient size to utilize fully the labor of one man with average per-cow labor inputs for the feeder calf production systems. This is accounted for by the low per-head labor requirements combined with the high-capital requirements that prevail if the feeder calf system is used. Although a somewhat larger operation would normally increase efficiency, this size of operation should be adequate to provide a reasonably good income for the producer.

Table 1

RESOURCE REQUIREMENTS OF BEEF COW HERDS

Requirements Per Cow

	Sale Wt. (lbs.)	Feed			Pasture Days	Man-Hours of Labor	Value of Livestock	Nonpasture Feed Cost	Value of Pasture Consumed	Labor Cost	Other Costs*
		Corn (bu.)	Protein (lbs.)	Hay (tons)							
Feeder Calf by Range Herd	450	....	100	1.5	210	7	$173	$ 38	$29	$ 7	$18
Baby Beef by Farm Herd	800	40	250	2	210	13	173	107	29	13	28

Requirements for The Cow Herd†

	No. Head	Feed			Pasture Days	Man-Hours of Labor	Value of Livestock	Nonpasture Feed Cost	Value of Pasture Consumed	Labor Cost	Other Costs*
		Corn (bu.)	Protein (cwt.)	Hay (tons)							
Feeder Calf by Range Herd	131	.....	131	197	27,510	917	$22,663	$ 4,978	$3,799	$ 917	$2,358
Baby Beef by Farm Herd	97	3,880	243	194	20,370	1,261	16,781	10,379	2,813	1,261	2,716

*Other costs include depreciation, repairs, interest, marketing costs, and death loss.

†Size of enterprise is based on a total input of $30,000 with pasture and labor costs excluded.

An average range beef herd would require about 100 pounds of protein supplement, 1.5 tons of hay, 210 pasture days, and 7 man-hours of labor or their equivalent per head annually. Although the sale weight per calf sold is assumed to be 450 pounds, an average of only 340 pounds would be sold per cow because of the 90 per cent calving rate and the holding back of heifers for replacement of cows in the herd. There also would be an average of 160 pounds of cull cows sold per cow in the herd. For a herd of 131 cows, plus bulls, young and replacement stock, about 131 hundredweight of protein supplement, 197 tons of hay, 27,510 pasture days, and 917 man-hours of labor or their equivalent would be required.

The farm beef herd producing baby beef would require an average of about 40 bushels of corn or its equivalent in other grains, 250 pounds of protein supplement, 2 tons of hay, 210 pasture days, and 13 man-hours of labor per head annually. About 600 pounds of baby beef and 160 pounds of cull cow would be produced per cow annually under this system. For a herd of 97 cows, plus bulls, young and replacement stock, an average of about 3,880 bushels of corn, 243 hundredweight of protein supplement, 194 tons of hay, 20,370 pasture days, and 1,261 man-hours of labor resources would be required.

The inputs used in determining the capital requirement for the two cow herd systems are livestock value, feed cost, and miscellaneous other costs—including marketing charges, interest, depreciation, repairs of facilities, and death losses. With the assumptions used in this study, the per-cow capital requirement for the range beef herd would be about $229—$173 for livestock investment, $38 for feed, and $18 for other costs. For a 131-cow herd, the livestock investment would be about $22,663; nonpasture feed cost, $4,978; other costs, $2,358. The farm beef herd would have a per-cow capital requirement of about $308—$173 for livestock investment, $107 for feed, and $28 for other costs. The livestock investment in a 97-cow herd would be about $16,781; feed cost, $10,379; and other costs, $2,716.

Because of the large investment in livestock, capital requirements per head would be relatively large for all beef cow systems. For both systems described here, the investment in livestock represents the largest capital input, but for the feeder calf system, investment in livestock represents a larger share of the total inputs than for the baby beef system. Since the calves would be fed out in the baby beef system, feed becomes a relatively more important in-

put than in the range system, although the livestock input remains larger than the feed input. With relatively more of the total inputs in feed and less in breeding stock, more short-term and less intermediate-term capital would be needed for the baby beef system than for the range system. The baby beef system also would require a larger investment in buildings and equipment than would the feeder calf system. Creep feeding equipment and drylot facilities would be required in the baby beef system and would not be used in the feeder calf system.

Land requirements would not vary for the two systems on a per-cow basis, as about the same amount of pasture would be required per cow and calf regardless of the system used. This requirement is given in pasture days and includes the pasture requirements for replacement stock as well as for the producing cow. A pasture day is the amount of pasture consumed by a mature, 1,000 pound beef animal in 1 day. Younger stock will consume proportionately less per day. Value of pasture consumed was determined on the basis of rental costs of pasture in the Flint Hills area, where definite rental prices are established each year. The estimated value of pasture consumed per cow would be about $29 annually. The range herd would consume pasture valued at $3,799, while the farm herd would consume pasture valued at $2,813.

Since the number of cows used in the feeder calf system would be larger and per-head pasture requirements are about the same for both systems, the pasture requirement for the feeder calf system is larger. It usually takes a larger land area to handle the size of enterprise determined by a limited capital input for a feeder calf system than for a baby beef system. The beef producer with a cow herd frequently owns the land he uses and most costs and returns to land are imputed values. However, in many range areas, pasture lands are also leased and pasture becomes a cash cost. Under these circumstances, short-term financing to pay pasture rents may be common. Where pasture land is owned, any financing of the pasture land would usually be on a long-term, real-estate security basis. Because of the wide variability in land and pasture requirements and in the methods of providing for these requirements, investment and cost data for these resources were not used in determining the size of herd under the capital limitation established. Thus, the capital requirements for investments in land or for pasture rental and labor costs would be in addition to the $30,000 capital limitation that was imposed.

A much larger per-head labor input for the baby beef system results in a total labor requirement which would be larger than for the feeder calf system, even though fewer than three quarters as many cows are in the enterprise. Creep feeding while on pasture and caring for the calves in the drylot feeding period are chiefly responsible for the larger labor input. Labor requirements for the sizes of herds used would be 13 hours per cow for the baby beef system and 7 hours for the feeder calf system. The baby beef cow herd would require 1,261 hours of labor, while the feeder calf cow herd would require 917 hours. Thus, with a wage rate of $1 per hour, the cost of labor to care for the baby beef producing herd would be $1,261 and that for the feeder calf producing herd, $917.

The comparison of the resource requirements of the two cow herd systems emphasizes the variation in requirements among different systems. The feeder calf system requires a large investment in land and breeding livestock to fully utilize the available labor on a ranch. Labor and other annual or short-term capital requirements, including feed other than pasture, are relatively small. A supply of roughage and protein concentrates for wintering the herd are the only major feed requirements in addition to pasture.

Although the baby beef system also requires a large investment in land and breeding stock as compared with many other beef production systems, it does not require as large an investment in these resources as does the feeder calf system. Instead, more labor and feed concentrates are substituted for some of the land and breeding stock requirements, thereby enabling the producer to expand gross income with a smaller investment in land and breeding livestock. This system also provides the producer with a more rapid turnover. Thus, a larger amount of short-term capital is required than for the feeder calf system. By feeding the calves and marketing them as baby beeves, a larger volume of business can be obtained with the use of a smaller quantity of long- and intermediate-term capital. Extra investment in feeding facilities is required, but this is not as great as the additional investment in breeding livestock and land would be if volume were expanded by increasing herd size and producing feeder calves.

Financing Cow Herds

The nature of the costs and investment in beef cow herd production systems poses special problems in financing. When feeder cattle are purchased, only a few weeks to a year may be required

to recover all or most of the total investment. However, several years may be required to recover the investment in a beef cow. More than a year is required from time of breeding until the calf crop is ready for sale, and one calf crop under normal conditions will only partly repay the cost of the cow, along with covering current operating expenses and providing an income for the proprietor.

In the Agricultural Loan Survey conducted by the Board of Governors of the Federal Reserve System in 1956, it was revealed

Table 2

TIME REQUIRED TO OBTAIN FIRST RETURN FROM FUNDS INVESTED IN A BEEF COW HERD

In Months

Age at Which Heifer or Cow is Purchased	Age at Which Heifer Will Calve*	Time lapse before calf crop is sold as:			
		Feeder Calves	Baby Beeves	Yearling Feeders	2-Yr.-Old Feeders
6	24	24	30	33-36	42-48
6	36	36	42	45-48	54-60
12	24	18	24	27-30	36-42
12	36	30	36	39-42	48-54
18	24	12	18	21-24	30-36
18	36	24	30	33-36	42-48
30	36	12	18	21-24	30-36
Cow, with Calf (age 1 mo.)	....	5	11	14-17	23-29

*Heifers which calve at the age of 24 months are bred at 15 months of age, while those which calve at 36 months are bred when 27 months old. Heifers purchased at the age of 18 months to calve at the age of 24 months and heifers purchased at the age of 30 months are bred before purchase by the producer, but all others must be bred after purchase.

that in the Kansas City District, bank loans to purchase livestock of other than feeder classes were the largest in size and dollar volume of all loans made to finance intermediate-length investments.[1] However, the typical length of loan for such purposes was only 6 months, although for most classes of breeding stock a much longer period is required to earn enough to repay the loan from these enterprises. Financial institutions often make loans with a short maturity length to finance intermediate-term investments and then renew them. This enables the lender to review and reappraise the loan periodically and to make adjustments which may be necessary. However, if this procedure is used, a written agreement containing all provisions for renewal is desirable. Obviously, some loans made for financing cow herds require several years for repayment.

[1]*Peterson, G. A., and Doll, R. J.*, Farm Loans, *Federal Reserve Bank of Kansas City, October 1957.*

Income from the typical cow herd operation is not distributed throughout the year, but rather is received at only one time or over a short period of time. This situation requires that repayments and note maturities be planned to coincide with the periods when incomes are available.

In addition, uncertainties as to prices, feed supplies, and other factors make the income from cow herds extremely variable and require flexibility in the financing program. This is one of the reasons it is difficult when purchasing cows to write notes with meaningful repayment schedules. Thus, in financing the purchase of a beef cow herd, it is essential that provision be made for flexibility both in maturities and in amounts to be repaid.

Although cow herd operators use credit principally to purchase cows, frequently credit also can be used advantageously for other purposes, such as the purchase of feed. A rancher or farmer may raise an insufficient amount of feed to completely finish the animal in a fattening program and may need additional funds to purchase concentrate feeds or roughage. In years of abnormally low feed production, a producer may need credit to supplement feed supplies for wintering his herd.

Much of the Great Plains area suffers from periodic droughts. Feed and pasture supplies are often drastically reduced below normal carrying capacities and it becomes necessary for a cow herd owner to liquidate a portion of his herd, secure additional feed supplies from other areas, or carry over surplus supplies of feed from years of better-than-average production. If the producer is forced to liquidate, he frequently does so at a considerable sacrifice in price, as many others are in the same position also and cattle supplies are large. When the drought is broken, the herd must be rebuilt while cow prices tend to be high because of the increased demand for restocking purposes. Although there have been periods in which it would have been most profitable for many producers to liquidate and restock, in most cases prudent handling of feed supplies is the better alternative.

If the producer can obtain feed to carry his herd through normal drought periods without any drastic liquidation, he will be in position to take advantage of the higher prices which usually result when restocking demand is high. This is another situation in which proper use of credit can be of great benefit to the cow herd operator in his effort to maximize income.

Regardless of the purpose for which credit is needed, the lender should be generally familiar with the system the borrower is following. The lender also should make an intensive effort to tailor loans to the credit requirements of the operator. If the loan is for financing a cow herd, a flexible instalment loan with a maturity of several years and payments made at the time of year when the calves or feeder livestock are sold is appropriate. Loans made for the purpose of carrying feed supplies over from years of abundant production or for purchasing supplemental feeds in drought years also probably would need to be intermediate-term flexible loans. If the loan is for purchasing supplemental feed, for paying taxes, or for the purpose of financing some other type of current operating expense, a short-term loan maturing at the time the calves or feeder livestock are sold would be most appropriate. In the cow herd systems, however, a relatively large proportion of the required capital is of the type for which intermediate-term financing can be used most appropriately. For example, about three fourths of the capital requirements for the feeder calf producing herd and about three fifths of the capital requirements for the baby beef producing herd are of the type that would suggest that intermediate-term financing would be most appropriate.

PASTURE FEEDING SYSTEMS

Forages—pasture, hay, and silage—are used in varying quantities and proportions in all beef production systems. Pasture, as a form of forage, has features which make it preferable to other forms as a feed for cattle. When on pasture, cattle move to the feed and harvest it, thus reducing the time and labor required by the operator for harvesting if hay or silage are utilized. Gains on pasture usually are less costly, since the grass is a cheaper form of roughage than hay or silage. Also, less labor usually is required to feed and care for cattle on pasture than in drylots.

The finishing of a calf from the time it is weaned until it is ready for slaughter requires growth of the calf to an adequate size and the fattening of the animal to the desired finish. Calves may be fed to grow and fatten simultaneously, as in the baby beef production system, or they may be fed growth-promoting rations and then fattened after development of skeletal and muscular tissues. A beef animal fed a strictly growth-promoting ration is considered a stocker, while an animal fed to fatten is a feeder.

While a stocker enterprise may be carried on by a producer as a self-contained operation, it is more often handled in conjunction with a cow herd or a feeding enterprise. Specialized stocker operations are fairly common in areas such as the Flint Hills of Kansas and Sand Hills of Nebraska. Usually, when cattle are handled as stockers, they receive little or no grain or other feed concentrates. Calves, especially when they are to be fattened by the same producer, are sometimes fed small amounts of grain so that they gain more rapidly and maintain their condition. It is also a common practice to utilize stocker cattle in stalk and stubble fields and on small grain pastures.

Systems that utilize pasture in producing slaughter cattle frequently require longer to complete the feeding operation than do drylot systems with the same classes of cattle. It is more common with pasture feeding to feed the cattle growth rations during earlier phases of the feeding cycle and fattening rations during the latter phases. In drylot feeding systems, all classes of cattle usually are put onto fattening rations early in the program. Thus, the pasture systems tend to require a longer period for completing the feeding

program. Gains per dollar of feed tend to be cheaper under the pasture systems, but financing costs are increased. Furthermore, the cattle frequently are not finished to as high a degree under the pasture systems.

Usually, when young cattle are to be pastured, they are fed growth-producing rations during the wintering phase of the operation. During the pasture phase of the program, the cattle may or may not be fed grain. Those fed grain on pasture require less pasture per animal and enable a larger number to be handled per unit of land. On highly productive grain farms that have a very limited quantity of pasture and abundant supplies of grain, it is more common to feed grain on pasture. Farms with larger amounts of pasture available frequently do not feed any grain on pasture, but may feed grain in drylots for a short period after the pasture season.

Deferred feeding systems are those in which grain feeding is minimized in both the wintering and pasturing phases, but in which the cattle are finished by feeding in a drylot after removal from pasture. This system makes use of relatively large quantities of roughages and pasture and relatively small amounts of grain. Under the Kansas plan, analyzed in this study, the cattle are on pasture only 90 days—from May until August. After the pasture phase, the cattle are full-fed grain in drylots for 90-100 days to finish them to the desired slaughter grade. Variations of this system permit differing lengths of time for the pasture and drylot phases of the program. The primary disadvantage of the deferred feeding systems is that they frequently require slightly longer than a year to complete and, consequently, it may be necessary to handle two groups of cattle for a short length of time each fall.

A closely related system is one in which cattle are wintered on growth-producing rations, but fed grain on pasture with a very short drylot feeding period after removal from pasture. This system shortens the time required for full-feeding, but increases the amount of grain needed to complete the program. The short drylot feeding period after the pasture feeding phase serves to increase the finish and, thus, reduce the price discount that frequently is levied on pasture fattened cattle.

Resource Requirements of Pasture Feeding Systems

Large variations occur in the feeding value of pastures for fattening cattle. The kinds of forage, soils, and weather conditions can affect the nutritive value of the pasture, the length of the grazing

season, and the amount of supplemental feeding needed in a pasture feeding system. Thus, planning requirements must be based on what can be expected with average or normal conditions. Pasture requirements are given on the basis of the amount of forage consumed in 1 day by a 1,000 pound beef animal receiving no other feed. This does not take into consideration the relative value of different forages in nutritive content. In considering a pasture feeding operation, the quality of pasture available will influence the quantities of other resources required. Resource requirements, which are based on the assumptions used for this study, are summarized in Table 3 for the four pasture feeding systems.

Deferred feeding systems utilizing two classes of cattle have been analyzed for their resource requirements. They are yearling steers and steer calves. Under both systems, the steers would be wintered on growth rations (the calves would be fed some grain, while the yearlings would receive no grain in the wintering phase), pastured without grain, and full-fed grain in a drylot for 90-100 days prior to marketing. Under the standard system, replacement cattle would be purchased in the fall—usually mid-October—wintered until mid-May, pastured until mid-August, and full-fed grain in drylots until sold in November. The cattle would be on the farm a total of about 13 months.

The deferred fed yearling steers would require about 30 bushels of corn or its equivalent in other grains, 300 pounds of protein supplement, 1.5 tons of hay, and 84 pasture days per steer. A light yearling steer would gain about 600 pounds under this system. With the previously described capital limitation of $30,000, the number of yearling steers that would be handled is 124. This size of enterprise would require about 3,720 bushels of corn, 372 hundredweight of protein supplement, 186 tons of hay, and 10,416 pasture days. The total gain would be about 744 hundredweight.

The deferred fed steer calves would require about 40 bushels of corn, 350 pounds of protein supplement, 1¼ tons of hay, and 72 pasture days per head. They would gain about 550 pounds in a 13-month feeding program. The size of enterprise with capital limited to $30,000 would be 136 head. This size of enterprise would require about 5,440 bushels of corn, 476 hundredweight of protein supplement, 170 tons of hay, and 9,792 pasture days. The total gain by 136 head of steer calves would be about 748 hundredweight.

The pasture fed steer calves would be on the farm a total of about 360 days and gain about 600 pounds per head. They would

Table 3

RESOURCE REQUIREMENTS OF PASTURE FEEDING SYSTEMS

Requirements Per Head

	Purchase Weight (lbs.)	Sale Weight (lbs.)	Feed: Corn (bu.)	Feed: Protein (lbs.)	Feed: Hay (tons)	Pasture Days	Man-Hours of Labor	Purchase Cost	Non-pasture Feed Cost	Value of Pasture Consumed	Labor Cost	Other Costs*
Yearling Steers—Deferred Fed	600	1,200	30	300	1.5	84	10	$124	$85	$12	$10	$33
Steer Calves—Deferred Fed	450	1,000	40	350	1.25	72	9	92	95	10	9	34
Steer Calves—Pasture Fed	450	1,050	50	300	0.8	72	11	92	97	10	11	33
Steer Calves—Wintered, Grazed	400	775	....	150	1.0	126	6	82	28	18	6	17

Enterprise Requirements†

	No. Head	Total Gain (cwt.)	Feed: Corn (bu.)	Feed: Protein (cwt.)	Feed: Hay (tons)	Pasture Days	Man-Hours of Labor	Purchase Cost	Non-pasture Feed Cost	Value of Pasture Consumed	Labor Cost	Other Costs*
Yearling Steers—Deferred Fed	124	744	3,720	372	186	10,416	1,240	$15,376	$10,540	$1,488	$1,240	$4,092
Steer Calves—Deferred Fed	136	748	5,440	476	170	9,792	1,234	12,512	12,920	1,360	1,234	4,624
Steer Calves—Pasture Fed	135	810	6,750	405	108	9,720	1,485	12,420	13,095	1,350	1,485	4,455
Steer Calves—Wintered, Grazed	236	885	.....	354	236	29,736	1,416	19,352	6,608	4,248	1,416	4,002

*Other costs include depreciation, repairs, interest, marketing costs, and death loss.

†Size of enterprise is based on a total input of $30,000 with pasture and labor costs excluded.

require about 50 bushels of corn, 300 pounds of protein supplement, 0.8 tons of hay, and 72 pasture days. With capital limited to $30,000, the size of enterprise would be 135 head, which would require about 6,750 bushels of corn, 405 hundredweight of protein supplement, 108 tons of hay, and 9,720 pasture days. The total gain of 135 steers would be about 810 hundredweight.

The growth of stocker calves into yearling feeders would be accomplished with about 150 pounds of protein supplement, 1 ton of hay, and 126 pasture days per head. Each calf would gain about 375 pounds. With a capital limitation of $30,000, there would be 236 head handled under this system. An enterprise of this size would require about 354 hundredweight of protein supplement, 236 tons of hay, and 29,736 pasture days. Total gain of the enterprise would be about 885 hundredweight.

For the pasture feeding systems, the capital requirements—which include purchase cost, nonpasture feed cost, and miscellaneous costs—vary considerably depending on the system used. The per-head capital requirements of the systems discussed would be:

System	Total Capital	Livestock Purchase	Nonpasture Feed Cost	Other Costs
Yearling Steers—Deferred Fed	$242	$124	$85	$33
Steer Calves—Deferred Fed	221	92	95	34
Steer Calves—Pasture Fed	222	92	97	33
Steer Calves—Wintered and Grazed	127	82	28	17

Where the size of enterprise is based on a capital input of $30,000, the number of head handled and the distribution of the requirements would be:

System	No. Head	Livestock Purchase	Nonpasture Feed Cost	Other Costs
Yearling Steers—Deferred Fed	124	$15,376	$10,540	$4,092
Steer Calves—Deferred Fed	136	12,512	12,920	4,624
Steer Calves—Pasture Fed	135	12,420	13,095	4,455
Steer Calves—Wintered and Grazed	236	19,352	6,608	4,002

Total pasture requirements for the three systems where grain is fed do not vary greatly because the higher number of pasture days required per head for the yearling steers is largely offset by the greater numbers of steer calves handled in the other two enterprises. The stocker calves require a larger amount of pasture per head, since they are pastured for a much longer season than are the grain fed cattle. The pasture cost for deferred fed yearling steers would be $12 per head and $1,488 for an enterprise of 124 head. The deferred fed calves would require pasture valued at $10

per head and $1,360 for an enterprise of 136 head, while the pasture fed calves would consume $10 worth of pasture per head and $1,350 for an enterprise of 135 head. The wintered and grazed steer calves would require $18 worth of pasture per head and $4,248 for an enterprise of 236 head.

The amount of labor required per head for the three systems where grain is fed also would not vary greatly. The deferred fed yearlings, deferred fed calves, and pasture fed calves would require about 10, 9, and 11 hours, respectively, on a per-head basis. The labor input per head of the wintered and grazed calves would be relatively low—about 6 hours. Using the $1-per-hour rate, the labor input for 124 head of deferred fed yearling steers would be $1,240; for 136 deferred fed steer calves, $1,234; and for 135 pasture fed calves, $1,485. The labor requirements for 236 head of wintered and grazed steer calves would be $1,416. Thus, while the wintered and grazed steer calves require much less labor per head, the enterprise requirement would not vary greatly for the different systems.

The comparison of the resource requirements for the pasture feeding systems emphasizes the variation in types of resources required and, therefore, in the adaptability of the different systems for individuals whose resource stocks vary considerably. A relatively small proportion of the capital requirements for these four systems are of an intermediate-term type, principally because the investment in livestock is of short- rather than intermediate-term length. The time that capital is tied up in livestock is 13 months for the deferred feeding system and 12 months for pasture fed calves and wintered and grazed stockers. Investment in livestock is the largest single input for the deferred fed yearling steers and the wintered and grazed steer calves. Feed costs are as large as livestock investment for the deferred fed and pasture fed calves. When land and labor costs are excluded, the feed and livestock inputs make up about 85 per cent of the capital requirements for all four pasture feeding systems. However, for the deferred fed and pasture fed calves, livestock investment was about 42 per cent of the total, while livestock investment made up 51 per cent of capital input for the deferred fed yearlings and 65 per cent for the wintered and grazed stocker calves. For the size of enterprise supported by a $30,000 capital limitation, labor costs are similar for all four pasture feeding systems. About the same quantities of pasture are required for the three systems where the steers are fattened, but the stocker calf enterprise would require about three times

more pasture than the systems where grain is fed. Similar lot and shelter facilities are needed for all four systems, except that drylot feeding equipment is not necessary for the system where stocker calves are wintered and grazed, and pasture feeding equipment is needed for the calves fed grain on pasture.

Financing Pasture Feeding Systems

Financing used in cattle feeding operations is chiefly for the purchase of livestock. A beef animal is relatively costly, and the purchase price accounts for a major part of the total capital required. However, some producers may need to finance feed or other production costs. Feed is also an important input and, in areas where insufficient quantities are raised or where individual feeders require more feed than they produce, feed purchases may need financing. In addition, even where adequate supplies of grain and forage are grown, it is necessary to purchase protein supplements and feed additives such as minerals, antibiotics, and stilbestrol. The costs other than livestock and feed are relatively small, but can be fairly substantial amounts where beef enterprises are large. Where labor has to be hired, the cash cost also can be substantial. Pasture land may be rented and, in this way, becomes an operating cost, which could also require financing. Facilities and equipment used in pasture feeding systems are usually less elaborate than similar facilities for drylot feeding systems. In the harsher climates, in addition to feeding equipment, some shelter will be needed for wintering the cattle. In systems where grain is fed on pasture, bunks and hauling equipment are needed. Feeding facilities also are needed for the short drylot feeding period after the cattle are removed from pasture in the late summer or fall months.

The four systems that utilize pasture as a feed for purchased stock cattle and for which production requirements are analyzed in this study each require a year or longer for completion of the production process. Thus, the time required to repay some of the borrowed funds may be a year or longer.

Deferred feeding systems, with either yearling steers or steer calves, require 13 months for completion under the commonly recommended programs. Since the replacements may be purchased prior to the time the previous year's fattened cattle are sold, it frequently is necessary to have two droves of cattle simultaneously and, thus, temporary financing for both groups. The feeding of yearling steers under the deferred feeding system has a higher cap-

ital requirement on a per-head basis because the animals are heavier and require more feed than most of the other pasture feeding systems. Slightly more than half of the capital inputs (land and labor costs excluded) for this system is in livestock investment. Of the remaining annual capital inputs, about 35 per cent is for feed and about 14 per cent for miscellaneous costs.

Financial requirements for deferred fed steer calves differ from yearling steers primarily in the proportions needed for feed and livestock. In this system, about 42 per cent of the total capital input is for purchasing livestock and 43 per cent for feed. This compares with a 51-35 percentage split for the two inputs, respectively, for yearling steers. Thus, although the total weight gain for the two systems is about the same for a $30,000 enterprise, the proportion of inputs used varies considerably. Where feed is more limited or relatively more costly, the older class may be better adapted, but where feed is abundant or relatively less costly, the younger class usually is more suitable.

The steer calves fed grain on pasture have about the same financial requirements as the deferred fed calves, with 41 per cent of the capital inputs for livestock, 44 per cent for feed, and 15 per cent for miscellaneous. However, the calves fed on pasture require a month less for completion of the program—eliminating the necessity of financing two groups of calves at the same time, which sometimes occurs under the deferred system. As compared with the rations for deferred feeding systems, grain makes up a greater proportion of the total feed for pasture fed calves. However, the total feed cost is only slightly higher for the pasture fed calves, since they are kept for a shorter time, but are on pasture longer.

The wintering and grazing of stocker calves varies from the other pasture systems in the relatively low feed requirement. These calves receive only harvested roughages, pasture, and protein supplement. In this system, about 65 per cent of the capital inputs are for purchase of livestock, only 22 per cent for feed, and 13 per cent for miscellaneous costs. With $30,000 for capital inputs, exclusive of pasture and labor, 236 head of steer calves can be financed. Pasture requirements, however, are about three times as large in this system as for the other pasture feeding systems. Pasture sometimes is rented and then becomes a cash operating expense. If this is the case, pasture costs also may need to be financed.

Even where a producer owns his land, he may need financing for such purposes as renovating, fertilizing, reseeding, or paying

taxes. These expenditures may seem somewhat unrelated to the beef production system, but they do have a direct effect on the amount and profitability of beef production on these pastures.

Except for facilities and equipment, the capital requirements for pasture feeding systems are primarily short-term. However, the livestock are held for a full year or slightly longer so that financing for this purpose—the most commonly used—is for a longer period of time than many other short-term loans. As will be shown, this is one of the principal differences between financing pasture feeding systems and the drylot feeding systems described in the following section.

DRYLOT FEEDING SYSTEMS

A LARGE SHARE of the cattle fattened for market in the United States is fed harvested feeds in drylots. This is one of the more common types of cattle finishing operations. In the past, drylot feeding was centered in the Corn Belt, but with the spreading of feed grain production, it is becoming common in many other parts of the Nation. The increased production of feed grains in the Plains states has resulted in increased cattle feeding operations in the Tenth District area. Drylot feeding usually is strictly a fattening operation in which rations with a high proportion of feed grains are fed.

The usual practice in drylot feeding operations is to full-feed grain, i.e., limit roughage so that the cattle consume a minimum of about 1.5 pounds of grain per day for each 100 pounds of liveweight. This rate of grain consumption is necessary if maximum rates of gain are to be achieved while finishing the cattle. However, at times, it may be more profitable to limit the grain and increase the amount of roughage fed.

For the purposes of this study, five drylot feeding systems were selected. These systems include one using 2-year-old steers; two using yearling steers (one fed a liberal grain ration and one a liberal roughage ration); one using steer calves; and one using heifer calves.

Only 3 to 4 months are needed for finishing 2-year-old steers in a drylot operation. A number of years ago this was a common system of drylot feeding, but as demand for beef has shifted to lighter-weight cuts, it is becoming less important.

Two systems of feeding yearling steers were analyzed to demonstrate the effects of substitution of roughage for grain in a drylot ration. When forages are substituted for grain in the ration, the rate of gain is reduced, the time needed to complete the feeding operation is extended, and the degree of finish tends to be reduced. This results from a lowering of the nutritive value of the ration when a larger proportion of roughages is fed. Roughages are lower than grains in feeding value on a pound-for-pound basis and are also more bulky than grain, so that the total weight of feed consumed per day is reduced.

There are two reasons why forages may be substituted for grain in drylot rations. First, a producer may have large supplies of roughages—which are frequently difficult to market—but limited supplies of grain. Second, if the cost of the roughages is relatively less than that of feed grains, it will be cheaper to produce beef by feeding a larger proportion of roughages unless there is a wide price differential between well finished and partly finished cattle. Savings, as a result of forage substitution, must be large enough to pay the extra costs and risks which result from a longer feeding period and the lower degree of finish.

The feeding of younger classes of cattle in farm feed lots has become more common in recent years. They have several advantages as feeder cattle, including lower initial cost for feeder stock, more efficient gains, and the fact that they can be finished to provide lighter carcasses for which demand has been increasing sharply. However, a longer feeding period is required and the risk from death losses is somewhat greater than with older classes of livestock. Steer calves frequently are put onto a full feed of grain more slowly than older classes of cattle so they can achieve the necessary growth before reaching the desired finish.

Heifer feeder cattle usually cost less per hundredweight than steers of the same quality and age. Although they normally also sell for less as slaughter animals, the difference between slaughter steer and heifer prices is usually not so great as is that between feeder steer and heifer prices. Heifers also mature at a younger age, so that less time is required to fatten them. They also usually put on gains more cheaply than do steers. However, with the use of synthetic hormones, the difference is not so great as formerly. The chief disadvantage to feeding heifers is that they may have been bred and losses may occur from calving in the feed lot.

Resource Requirements of Drylot Feeding Systems

Although most drylot feeding operations may resemble one another rather closely, resource requirements are diverse because of the different classes of cattle, types of rations fed, and the varied facilities and equipment used. Based on the assumptions used for this study, the requirements for the five typical drylot feeding systems described are summarized in Table 4.

When cattle feeding was a strictly complementary enterprise to the crop production program of a farm, the feeding of older

Table 4

RESOURCE REQUIREMENTS OF DRYLOT FEEDING SYSTEMS

	Requirements Per Head									
	Purchase Weight (lbs.)	Sale Weight (lbs.)	Feed: Corn (bu.)	Feed: Protein (lbs.)	Feed: Hay (tons)	Man-Hours of Labor	Purchase Cost	Feed Cost	Labor Cost	Other Costs*
2-Year-Old Steers	900	1,150	35	100	0.5	3	$186	$62	$3	$26
Yearling Steers—Liberal Grain	700	1,100	50	100	0.75	4	144	87	4	27
Yearling Steers—Liberal Roughage	650	1,150	42	300	1.25	5	134	95	5	31
Steer Calves	450	950	55	200	0.75	6	92	98	6	30
Heifer Calves	400	800	30	300	1.0	4	69	75	4	26

	Enterprise Requirements†									
	No. Head	Total Gain (cwt.)	Feed: Corn (bu.)	Feed: Protein (cwt.)	Feed: Hay (tons)	Man-Hours of Labor	Purchase Cost	Feed Cost	Labor Cost	Other Costs*
2-Year-Old Steers	110	275	3,850	110	55	330	$20,460	$ 6,710	$330	$2,860
Yearling Steers—Liberal Grain	116	464	5,800	116	87	464	16,704	10,092	464	3,132
Yearling Steers—Liberal Roughage	115	575	4,830	345	155	575	15,410	10,925	575	3,565
Steer Calves	136	680	7,480	272	102	816	12,512	13,328	816	4,080
Heifer Calves	176	704	5,280	528	176	704	12,144	13,200	704	4,576

*Other costs include depreciation, repairs, interest, marketing costs, and death loss.
†Size of enterprise is based on a total input of $30,000, with land and labor costs excluded.

classes of cattle for a few winter months was the primary type of drylot operation. One of the principal classes of cattle fed was 2-year-old steers. This class was fed about 120 days; gained around 250 pounds; and consumed about 35 bushels of corn, 100 pounds of protein supplement, and half a ton of hay. For this study, the size of enterprise would be 110 head, as determined by the capital input limitation of $30,000. Such an enterprise would require about 3,850 bushels of corn, 110 hundredweight of protein supplement, 55 tons of hay, and result in a total gain of 275 hundredweight.

Yearling steers, fed a liberal grain ration would require about a 200-day feeding period and gain around 400 pounds per head. The approximate per-head feed requirements would be 50 bushels of corn, 100 pounds of protein supplement, and three fourths ton of hay. The size of enterprise with the capital limitation of $30,000 would be 116 head, which should produce a total gain of about 464 hundredweight. Total feed requirements would be about 5,800 bushels of corn, 116 hundredweight of protein supplement, and 87 tons of hay.

For yearling steers fed on a liberal roughage ration, a 270-day feeding period would be required to obtain a gain of about 500 pounds. The per-head feed requirements would be about 42 bushels of corn, 300 pounds of protein supplement, and 1¼ tons of hay. The size of enterprise would be 115 head, which should produce a total gain of about 575 hundredweight. Such an enterprise would require about 4,830 bushels of corn, 345 hundredweight of protein supplement, and 155 tons of hay.

Steer calves, full-fed in a drylot, would require a 300-day feeding period to gain about 500 pounds per head. They would require approximately 55 bushels of corn, 200 pounds of protein supplement, and three fourths ton of hay per head. With $30,000 of capital, as defined previously, the size of enterprise would be 136 head and the total gain should be around 680 hundredweight. This size of enterprise would require about 7,480 bushels of corn, 272 hundredweight of protein supplement, and 102 tons of hay.

Heifer calves would be fed for 270 days, gain nearly 400 pounds, and require about 30 bushels of corn, 300 pounds of protein supplement, and 1 ton of hay per head. The size of enterprise would be 176 head, the total gain should be approximately 704 hundredweight, and the enterprise requirement would be about 5,280 bushels of corn, 528 hundredweight of protein supplement, and 176 tons of hay.

The capital requirements of the five drylot feeding systems vary considerably on a per-head basis and in the distribution between different inputs. Capital requirements per head for the drylot feeding systems discussed would be:

System	Total Capital	Livestock Purchase	Feed Costs	Other Costs
2-Year-Old Steers	$274	$186	$62	$26
Yearling Steers—Liberal Grain	258	144	87	27
Yearling Steers—Liberal Roughage	260	134	95	31
Steer Calves	220	92	98	30
Heifer Calves	170	69	75	26

Where the size of enterprise is determined by a limited capital input of $30,000, the requirements would be distributed as follows:

System	No. Head	Livestock Purchase	Feed Costs	Other Costs
2-Year-Old Steers	110	$20,460	$ 6,710	$2,860
Yearling Steers—Liberal Grain	116	16,704	10,092	3,132
Yearling Steers—Liberal Roughage	115	15,410	10,925	3,565
Steer Calves	136	12,512	13,328	4,080
Heifer Calves	176	12,144	13,200	4,576

The labor inputs for the drylot feeding systems vary considerably more than for the pasture feeding systems as a result of the differing lengths of the feeding periods. Using $1 per hour as the wage rate, the 2-year-old steers—which require about 3 hours of labor per head—would have an enterprise labor cost of $330, the lowest of any system in this study. The yearling steers, on a liberal grain ration, would require about 4 hours of labor per head and have an enterprise labor cost of $464, while the yearling steers, on a liberal roughage ration, would require a per-head labor input of 5 hours and an enterprise labor cost of $575. The steer calves would have a per-head, labor requirement of 6 hours and an enterprise labor cost of $816, while the heifer calves would have a per-head requirement of 4 hours and an enterprise labor cost of $704. Labor inputs are highly variable within drylot systems, depending upon the kinds and efficiency of feeding facilities, size of enterprise, and the efficiency of individual operators. Drylot feeding operations offer one of the best opportunities in the beef industry for adopting labor-saving devices. Nearly complete automation of feeding operations is possible and enables a greatly expanded size of operation per unit of labor input.

Significant variations occur in the resource requirements of the drylot feeding systems. The principal variation is between in-

vestment in livestock and feed. Systems utilizing older classes of cattle have a larger share of their total inputs in livestock investment than do systems using younger classes. Another significant difference in systems is the length of the feeding period, which is primarily a function of the age and class of cattle, although the ration fed also is an influencing factor. Substitution of forages for grain in a ration increases the time necessary to reach the same finish of a beef animal for slaughter. This also is one of the principal differences in pasture feeding systems and drylot feeding systems, although the form of forage consumed is an equally important difference in the two operations. The capital requirements for the drylot systems primarily are short-term. The investment in feed lots, facilities, and equipment is intermediate- or long-term, and in some operations can be relatively large.

Financing Drylot Feeding Systems

In drylot feeding operations, credit is commonly used to purchase the feeder stock. Most feeders do not possess adequate amounts of liquid funds to purchase all of the cattle they wish to feed. Therefore, it is necessary to borrow a portion, and sometimes all, of the funds needed to purchase feeder stock. Most drylot systems have a shorter length feeding period than do the pasture feeding systems and, consequently, the length of time for which financing is needed usually is shorter.

Financing also may be required for purchasing feed. Producers of feeder cattle may choose to purchase feed and fatten their calves for market rather than sell them, or a feeder may not raise sufficient quantities of grain to feed all the cattle he can handle. Some feeders purchase grain or roughage at harvest time when it can be acquired most cheaply and, if large amounts are purchased, it may be necessary to borrow funds to finance the purchases. It also is sometimes necessary to finance the purchase of protein supplements, minerals, and feed additives.

The financing of 2-year-old steers probably involves more risk than other drylot feeding systems. When heavy cattle are purchased and fed, it is usually necessary to obtain a positive price margin to cover all costs when selling the cattle. This is a result of the relatively high cost of putting gains on this class of cattle, which have already completed their growth and the gain they make is primarily "finish." In some instances, when cattle prices are very

high in relation to feed, it may be possible to fatten this class of cattle at a cost per 100 pounds of gain which is less than the selling price per hundredweight. However, to pay the costs other than feed and livestock, it usually will be necessary to have a positive price margin. Feeding 2-year-old steers requires approximately 68 per cent of the capital inputs for investment in feeder stock, 23 per cent for feed cost, and 9 per cent for miscellaneous costs.

A relatively large investment in livestock also is required for the systems utilizing yearling steers. About 56 per cent of the capital inputs for those fed a liberal grain ration and about 51 per cent for those fed a liberal roughage ration are for investment in livestock. The percentages required for feed are about 34 for the liberal grain ration system and 37 for the liberal roughage system, while 10 and 12 per cent, respectively, are required for miscellaneous costs for the two systems. Financing differs principally because of variation in the time needed to complete the two systems. The proportion of funds used for meeting feed and livestock costs also would vary, with a larger share of the total inputs for the liberal grain fed steers being used for livestock costs. Usually, lighter cattle are purchased for the liberal roughage feeding system, which requires less initial investment for feeder stock, but more for feed.

The systems utilizing calves require about equal inputs for feeder cattle and feed. The steer calves require about 44 per cent of total capital inputs for feed; 42 per cent for feeder stock; and 14 per cent for miscellaneous costs. Heifer calves normally cost less per pound than steer calves and, consequently, require a slightly lower proportion of total inputs in livestock investment—about 40 per cent compared with 42 per cent for steer calves, but require about the same proportion—44 per cent—of the total inputs for feed. The feeding period is shorter for the heifer calves so that interest and other costs associated with time also are less than for steer calves in absolute amounts, although they make up a larger share of total inputs. Since a large part of the gain put on by calves is from growth which is put on cheaply—relative to fattening gain—and because the initial cost for feeder stock usually is relatively low, it is frequently possible to make a profit on calves even though the selling price per pound is lower than the purchase price.

Drylot operations, as indicated previously, provide an excellent opportunity for mechanization of the feeding process. Power operations have been adopted widely in feeding operations in recent years, and systems have been developed with nearly complete

automation of operations previously done by hand labor. This enables a very great expansion in the size of operation with a limited labor supply. However, most of these systems are relatively expensive to install and require intermediate- or long-term investments. With many innovations being closely associated with large-scale operations and mechanization in farming, the rapid adoption of improved technology will increase the credit requirements of cattle feeders. A larger capital supply is needed by each operator for facilities and for purchasing more livestock and feed as size of enterprise is expanded. These developing characteristics of the beef production industry may cause increased specialization and different problems for producers and financial institutions.

COMMERCIAL CATTLE FEEDING

THE OPERATOR of a commercial feed lot usually is defined as one who purchases all his feed, hires a majority of his labor, and feeds cattle for other people on a custom basis. In general, commercial yards feed cattle for three classes of customers—packers, ranchers who feel their feeder cattle are not bringing high enough prices, and speculators.

The fees charged usually are based upon the amount and kinds of feed consumed. In addition to the feed cost, a basic fee is added per ton for use of facilities, grinding the feed, handling, and feeding. Some yards vary their feed prices from week to week, while others will guarantee the price to the customer for a 30- or 60-day period. The feed is weighed to the cattle on a daily basis and usually is billed to the owner of the cattle for immediate payment at 2-week intervals. Costs for vaccine and other veterinary bills are extra, but most other costs are included in the charge for feed and the basic fee.

Operation of a commercial feed lot is a highly specialized activity in which economies of scale can be realized. Thus, costs vary widely depending on differences in such factors as capacity, degree of mechanization, and type of management. Because of economies of scale in a successful operation, there is pressure on management to develop large-scale enterprises. On the other hand, with the large capital investment and the necessity of providing for considerable skilled labor, efficiency of the operation drops sharply if the resources are not fully employed on a continuous basis. Thus, there also are definite limitations on the amount of expansion that any one operator can undertake profitably. Managerial ability—being able to obtain and combine the resources used most efficiently—to a large degree will determine the size of an individual commercial feed lot.

With such variation in the capital requirements for operating commercial feed lots, the amounts and kinds of financing will vary widely. A number of studies have been made which indicate the capital requirements needed for facilities for a commercial feed lot. John A. Hopkin of the Bank of America, in a study made in 1956, estimated that on an average it took $24.27 per head for in-

vestment in feed lot facilities for commercial operators who had an average feed yard capacity of 5,790 head. Thus, the total capital requirement for lot facilities on the average size commercial yard would have been about $140,000. More recently, the Economic Research Division of Consumers Cooperative Association, in a study made of 17 commercial lots, concluded that the average capital requirement for operating a feed yard of 5,000 head capacity is $235,000. The two estimates are much closer than the dollar figures would indicate. In the first place, Hopkin's study was made several years ago and since then costs have increased because of increasing prices and because commercial feed lots are becoming increasingly more mechanized and automatic. In the second place, the two estimates are not made for exactly identical requirements. The higher estimate includes a modernized feed mill and $20,000 for working capital. Since not all lots have modernized feed mills, the estimated value for the average feed mill in the Hopkin study would undoubtedly be lower. In Hopkin's study, a detailed breakdown of working capital requirements was made and was not included in the investment figure. Thus, it would appear that the $235,000 estimate made by the Economic Research Division of CCA for commercial lots in Colorado, Kansas, and Nebraska should be a fairly reliable average guide for planning purposes.

Although the commercial feed lot operator does not finance the investment in cattle, he does use this capital as part of his operation. The investment in cattle is nonequity working capital used by the feed lot operator, but provided from other sources on a noncredit basis. In a feed lot of 5,000 head, operating at capacity, the operator would be using about $700,000 of this type of nonequity working capital for the investment in cattle. This figure is based on the assumption that the average value of the cattle in the feed lot is equal to the average purchase cost of a yearling steer. On the basis of the estimated average capital requirement for operating a lot and the estimated value of cattle handled, it is apparent that an operator of a lot with a capacity of 5,000 head is handling around $1 million worth of capital if he is operating at capacity.

Loans made for financing the equipment facilities frequently need to be intermediate-term in nature. Repayments usually can be worked out most satisfactorily on an amortized basis, since in an active commercial lot income should be received quite regularly, as was pointed out previously. Loans made for working capital also sometimes tend to become intermediate-term in nature if the lots are kept full on a continuous, year-round basis. As one group

of cattle is shipped out, another would be brought in. Thus, even though the operator is usually paid by each customer at regular 2-week intervals, he needs to keep an inventory of such items as feeds and biologicals in addition to providing for the routine operating expenses such as labor and electricity. To the extent that these conditions exist in the commercial yards, the financing of working capital requirements differs substantially as compared with those of the systems described in the previous chapters.

It also should be pointed out that financing working capital requirements for commercial lot operators involves a different group of risks than prevail if these requirements are financed for many of the other beef production systems. In the first place, the contracts for a commercial operator usually are arranged so the feed prices are established for a definite period in advance. Thus, if feed inventories are held at levels which provide for these requirements, the operator can protect himself against the risks caused by drastic changes in feed prices. Furthermore, since the cattle being fed are owned by other individuals or firms, the lot operator does not bear the risk of changing cattle prices. Thus, if he is an efficient operator, has a realistic pricing system, and keeps his yard filled at near capacity levels—in other words, if management is good—the commercial feed lot operator should be an excellent customer for financial institutions.

Financial institutions also probably will be called upon to finance many of the cattle that commercial operators feed. These loans, however, would be made to the packers, ranchers, or other customers of the commercial feed lots. Therefore, each request for financing from these individuals needs to be considered separately. Two considerations are important in financing this type of customer. First, working capital to pay the feed lot operator at regular intervals through the feeding period must be provided in addition to the capital required for financing the cattle. This working capital requirement will become relatively large for most feeding systems conducted at commercial feed lots. Second, it is necessary to be familiar with the commercial feed lot operator who will handle the cattle for the customer. It is important to know his fees, at what intervals they are collected, when the cattle will be ready for market, and much other essential information.

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